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RADIUM

EDITED BY
CHARLES H. VIOL, Ph. D.
AND
WILLIAM H. CAMERON, M. D.

VOL. III JULY, 1914 No. 4

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A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY PHYSICS AND THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES

RADIUM

A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY, PHYSICS AND THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES.

Edited and Published by Charles H. Viol, Ph. D. and William H. Cameron, M. D., with the assistance of collaborators working in the fields of Radiochemistry, Radioactivity and Radiumtherapy.

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VOL. III JULY, 1914 No. 4

AN IMPORTANT CONTRIBUTION TO RADIUM THERAPY

THE WORK OF THE LONDON RADIUM INSTITUTE IN 1913.

The first report of the London Radium Institute, (British Med. Jour., Jan. 25th), 1913, was one of the most important contributions that have been made to the literature of radium therapy, and the second report (A Report of the Work Carried out at the Radium Institute, London, A. E. Hayward *Pinch*, Medical Superintendent, British Med. Jour., May 23rd, 1914; The Lancet, May 23rd, 1914.) while much briefer is no less interesting and encouraging. It is the policy of the Radium Institute not to treat operable cases of malignant diseases save under most exceptional circumstances. In view of this use of radium as a last resort it is very interesting to find many of the cases described as apparently cured. The permanence of these results can only be decided after a number of years, and then only can those cases which have remained without new manifestations of the disease be called cured. The statement in the report that "little or no effect appears to be exerted in the prevention of metastatic deposits, though the treatment does not, at any rate, hasten their dissemination" is a further reason for awaiting the test of time in judging results. The report deals with the cases which were treated at the Institute during the year 1913, and the following tabulated summary shows all the cases treated together with the results obtained. The report gives the additional facts that have been noted in the work with regard to the prognosis and treatment of various diseases and in the following we quote extensively from the report since the conservative opinions and the authoritative data given cannot fail to be of general interest.

	Examined but not Treated.	Results Not Yet Noted	Prophylactic Treatment Only	Apparently Cured	Cured	Improved	Not Improved	Abandoned Treatment	Dead	Total
CARCINOMA. Squamouscelled.										
Glabrous skin	1	..	1	2	..	4	4	1	..	13
Buccal, oral, lingual and pharyngeal mucous membranes	6	10	6	..	..	9	15	3	4	53
Oesophagus	5	..	..	..	..	4	4	1	..	14
Larynx	1	2	..	..	..	1	..	..	..	4
Vagina and vulva	..	..	1	1	..	3	1	1	1	8
Uterus	..	2	2	..	..	27	8	1	2	42
Penis	..	..	..	..	..	..	1	..	..	1
Bladder	..	..	..	3	..	3	..	1	2	9
Carcinoma, spheroidal celled										
Breast	11	22	11	2	..	40	19	11	12	128
Liver and gall bladder	..	..	..	..	..	1	..	..	..	1
Thyroid	..	..	..	..	..	3	..	..	1	4
Paget's disease	..	..	..	1	..	..	..	..	..	1
Carcinoma columnar-celled—										
Large intestine	1	4	2	..	..	..	..	1	1	9
Rectum	9	9	1	..	..	23	16	..	6	64
Stomach	..	..	..	..	..	1	1	1	..	3
Ovary	..	2	..	..	..	..	1	..	2	5
Prostate	1	..	..	..	..	4	..	..	..	5
Kidney and suprarenal gland	..	1	..	..	..	..	..	1	..	2
Parotid	..	..	..	..	..	..	1	..	..	1
Rodent Ulcer	4	21	2	40	..	34	7	3	..	111
SARCOMATA										
Spindle-celled	1	..	1	1	..	8	4	1	1	17
Round-celled	1	..	..	..	..	1	..	..	1	3
Melanotic	..	..	1	..	..	..	1	..	..	2
Myelosarcoma	1	..	..	..	..	1	..	..	..	2
Lymphosarcoma	..	1	..	..	..	2	..	..	..	3
Endothelioma	..	2	2	..	..	2	2	1	1	10
Lymphadenoma	..	..	..	..	..	4	2	1	..	7
Malignant glands	1	1	..	..	..	..	2	3	2	13
Parotid tumour	..	..	..	..	..	..	1	..	..	1
Abdominal tumour	..	..	..	..	..	..	1	..	1	2
Mediastinal tumour	..	1	..	..	..	4	..	1	..	6
Villous tumour of bladder	..	..	..	..	..	2	1	..	..	3
Polypi of vagina	..	..	..	..	1	..	..	..	..	1
Adenoma of thyroid	1	2	..	..	..	..	..	..	..	3
Fibromata	3	..	..	..	1	3	2	1	..	10
Fibroid disease of uterus	..	1	..	..	..	6	..	..	..	7
Leucoplakia	2	..	..	1	..	2	..	..	..	5
Naevi										
Capillary	..	4	..	..	1	19	1	..	..	25
Cavernous	1	1	..	..	2	8	2	..	..	14
Moles, warts and papillomata	1	2	..	..	8	6	1	..	..	18
Tuberculosis										
Glands	..	..	..	1	..	2	..	..	..	3
Skin	1	..	..	..	..	5	..	..	..	6
Conjunctiva	1	..	..	..	..	..	..	..	..	1
Spring Catarrh	..	..	..	1	..	1	..	..	..	2
Chronic inflammations	1	1	..	..	2	3	..	..	..	7
Chronic ulcerations	1	..	..	..	1	6	1	..	..	9

	Examined but not Treated.	Results Not Yet Noted	Prophylactic Treatment Only	Apparently Cured	Cured	Improved	Not Improved	Abandoned Treatment	Dead	Total
SKIN DISEASES—										
Keloid and vicious cicatrices	2	2	..	2	..	10	1	..	..	17
Lupus erpthematosus	..	..	..	..	..	6	..	..	..	6
Psoriasis	..	1	..	..	..	4	2	..	..	7
Pruritus	..	2	..	..	2	2	2	..	..	8
Chronic eczema	..	..	..	..	..	3	1	..	..	4
Lichenfication of skin	..	..	..	..	..	1	..	..	..	1
Mycosis fungoides	..	..	..	..	..	1	..	..	..	1
Roentgen-ray dermatitis	..	..	..	..	..	..	1	..	..	1
Telangiectasis	..	..	..	..	..	1	..	..	..	1
Hypertrichosis	..	..	..	..	..	..	1	..	..	1
GENERAL DISEASES—										
Arterio-sclerosis	3	1	..	..	..	2	1	1	..	8
Exophthalmic goitre	1	1	..	..	..	4	..	..	..	6
Myelogenous leukaemia	..	..	..	..	..	1	..	..	..	1
Myasthenia gravis	..	..	..	..	..	..	1	..	..	1
Neurasthenia	1	..	..	..	..	2	..	3	..	6
Neuritis	6	5	..	..	..	5	3	..	..	19
Gout	..	2	..	..	..	3	..	2	..	7
Neuralgias	..	2	..	1	..	2	1	..	..	6
Rheumatism	3	2	..	..	..	1	..	3	..	9
Arthritis deformans	41	69	..	..	..	47	39	8	..	204
Totals	112	176	30	56	18	341	152	50	37	972

"The results obtained in the treatment of epitheliomata affecting glabrous surfaces call for no fresh comment, and in suitable instances removal of the growth by radium may be confidently anticipated."

"Epitheliomata of the buccal, lingual and pharyngeal mucous membranes still prove both refractory and disappointing in their response to radium, but a new method of treatment has recently been devised which in instances of cancer of the tongue has given distinctly encouraging results. It consists in the burying within the carcinomatous nodule of a very small but intensely powerful radium emanation tube possessing an initial activity equivalent to that of 80 to 100 mgm. of radium bromide enveloped in a screen of 1 mm. of silver or 0.3 mm. of platinum, and giving an exposure of twenty-four hours duration. A fairly severe reaction follows, and in some cases the nodule ceases to grow and becomes replaced by dense fibrous tissue."

"Several cases of epithelioma of the oesophagus have been under treatment, but unfortunately the majority of these have been in so advanced a stage as to preclude all hope of success. In

those instances, however, where complete occlusion had not occurred, and it was possible to introduce radium actually into the lumen of the growth distinct though temporary benefit has resulted, and that this effect is not merely mechanical due to the dilation of the stricture by the apparatus is evidenced by the fact that the improvement in the power of swallowing has persisted for six or even nine months after the termination of the treatment."

Carcinoma of the uterus still continues to yield most gratifying results, and the effects of radium treatment in inoperable cases are far in advance of those obtained by any other known medical or surgical methods. The local manifestations of the disease are benefited in the most striking fashion, and the complete disappearance of fungating growth, arrest of hemorrhage and discharge, healing of ulceration and relief from pain are phenomena of almost daily occurrence. In favorable cases, moreover, the treatment appears to exert a distinctly retarding influence on the dissemination of metastatic deposits, and thus to arrest the progress of the disease. It is not possible, however, to speak of 'cure' even in these latter instances."

"Great care must be exercised in the treatment of recurrences, which make their appearance within six months of the performance of a *Wertheim's* operation. The functions of the trophic nerves of the pelvis seem often to be seriously impaired by the extensive and elaborate dissection which is associated with this method of hysterectomy, and for this reason the amount of radium used should be small, not exceeding 50 mgm., the screening not less than 1.5 mm. of lead, and the total exposure not longer than twenty hours spread over four or five days. Unless these precautions be observed a severe and extensive destructive reaction may follow the application of radium."

"In all cases where radium has been applied within the vagina the patient should be instructed to douche freely night and morning for at least six weeks after the termination of the treatment, as unless this be done an adhesive vaginitis not infrequently occurs. In some extremely susceptible subjects a transient proctitis has been noted to follow upon intravaginal treatment."

"The screening employed in cases of carcinoma of the uterus is either 1 mm. of silver or 2 mm. of lead, but the thinner screening should only be adopted when the cervical canal is patulous and the tube can be introduced into its cavity."

In cases of carcinoma of the breast it has been found that "many patients exhibit a great susceptibility to radium; the primary growth becomes smaller, infected glands and subcutaneous nodules lessen or perhaps even disappear. Little or no effect appears to be exerted in the prevention of metastic deposits, though the treatment does not, at any rate, hasten their dissemination. Some cases in which pleurisy, dependent upon carcinomatous invasion of the pleura, has been present have shown remarkable improvement, and the application of powerful apparatus screened with 2 mm. of lead over the affected pleura, after a preliminary

paracentesis, has effectually prevented the further formation of pleuritic effusion."

"A few patients have been under treatment at intervals of three or four months since the opening of the institute in September, 1911, and it has been noted that a stage in their treatment is reached sooner or later at which the response to radium fails, and the benefit derived becomes negligible."

"Small isolated recurrent nodules, inoperable by reason of their attachment to the sternum, clavicle, ribs, or rib cartilages, are best treated by burying a small powerful emanation tube screened with 1 mm. of silver in them for a period of twenty-four hours."

"Encouraging results have been obtained in the few instances of carcinoma of the thyroid that have come under notice, the progress of the disease has been arrested, and a decrease in the size of the existing growth has been obtained, the general discomfort and dysphagia when present being greatly relieved. The line of treatment employed has been the use of numerous powerful applicators screened with 2 mm. of lead and so disposed over the surface of the growth as to obtain the maximal cross fire irradiation. Burying of emanation tubes within the growth has not yet been adopted owing to the great tendency of these growths to fungate if any breach be made in the investing skin."

"The superficial lesion in *Paget's* disease is usually speedily cured by one hour's exposure to a half strength plate unscreened, but the underlying induration and affection of glands, if present, require prolonged treatment with heavily screened applicators if any real benefit is to be obtained; in cases in which the patient is willing to submit to operation this procedure should always be adopted."

"Carcinoma of the rectum displays much variation in its response to radium therapy, and numerous factors have to be considered in prognosis. Speaking generally, the soft annular and vascular type of growth is much more favorably affected than the flat, hard, non-annular plaque with much subjacent induration. In the treatment of this latter class of growth the action of the gamma rays (which it is impossible to prevent) on the healthy rectal mucous membrane opposite the plaque produces a proctitis, which though generally transient, sometimes proves both persistent and severe, and adds greatly to the patient's discomfort. In the treatment of the former type, if the radium tube be of proper dimensions and introduced accurately within the lumen of the growth little or no healthy mucous membrane is affected by the gamma rays, and no proctitis occurs."

"Growths situated in the upper half of the rectum appear to be more amenable to treatment than those in the lower, though this may be due to the fact that tenesmus is always more constant and severe when the growth is near the sphincters."

"The performance of a colostomy before radium treatment is often advisable, as the constant passage of faeces over a surface

that is reacting to radium frequently causes much pain. Idiosyncrasy is sometines responsible for curious results. Some patients are extremely susceptible to the action of radium, and proctitis appears quickly, is very severe, and persists for a long time. With others the reaction sometimes takes six or eight weeks to develop, proceeds exceedingly slowly, and does not disappear for two or three months."

"The routine method of treatment consists of a thirty hour exposure—five days of six hours each, with a tube containing 100 mgm. of radium bromide, screened with 2 mm. of lead and 3 mm. of rubber, and applied in actual contact with the growth, the series of exposure being repeated at the end of six weeks. If the patient proves extremely susceptible smaller doses are given at shorter intervals. In the most favorable cases the carcinomatous material shrinks and becomes replaced by dense fibrous tissue. In instances where the original growth has been of the annular type a fibrous stricture will result, which will need frequent and regular dilatation."

"The number of cases of carcinoma of the prostate which have been treated up to the present is not very large, but benefit has been noted in all of them. Haematuria, when existent, has been either diminished or abolished, pain has been greatly lessened, and the size of the growth decreased. Various methods of treatment have had to be adopted according to the nature of the case. When catheterization can be well tolerated, a 50 mgm. tube of radium bromide in a 'window' screen of 1 mm. of silver and 1 mm. of lead is introduced per urethram, and maintained in actual contact with the growth for a period of two hours a day on five successive days, and its action is supplemented by another tube of 100 mgm. in a screen of 2 mm. of lead, introduced into the rectum for six hours a day on five successive days."

"When catheterization is not practicable or advisable, the action of the rectal tube is reinforced by a powerful flat applicator screened with 2 mm. of lead, and placed either on the perineum or over the pubes."

"Nine cases of carcinoma of the bladder have been treated, and in six instances the results have been most gratifying. The haematuria, cystitis, and all subjective symptoms have disappeared, and cystoscopic examination has shown that the size of the growth has been greatly lessened, and any ulcerated surface has become covered with healthy epithelium."

"The treatment has consisted of the introduction of a 50 mgm. tube of radium bromide in a 'window' screen of 1 mm. of silver and 1 mm. of lead inserted per urethram, and maintained by means of a pliable silver wire in such a position that the window side of the apparatus is in actual contact with the growth. If the lesion be on the base of the bladder, a second tube screened with 2 mm. of lead is placed in the vagina in female, and in the rectum in male patients; but if on the anterior bladder wall, a flat applicator similarly screened, is fixed over the pubic region. The usual

length of exposure is ten hours intravesically in five days of two hours each, and thirty hours with the vaginal, rectal, or pubic applicators spaced over the same number of days."

"But little has been added to our knowledge of the treatment of rodent ulcer, but when dealing with the question of prognosis it appears justifiable to divide rodent ulcers into two definite clinical types:

1. The hypertrophic nodular type, with slight superficial ulceration of a scaly character. This class responds extremely well to radium, and yields most satisfactory results.

2. The excavating type, with undermined and over-hanging edges and a gelatinous base. This not infrequently proves very intractable, and repair is most difficult to effect."

"Whenever the size and situation of the ulcer permit, it is best to give one powerful unscreened exposure, a full strength plate being applied in actual contact with the ulcer for one, two, or three hours, according to circumstances. One such treatment usually suffices to produce an apparent cure. Exposures of short duration repeated at frequent intervals are not nearly so effectual, and instances have been met in which the adoption of this procedure appears to have been responsible for the development of an epithelioma on the site of the original ulcer."

"Rodent ulcers attacking cartilage, bone or mucous membranes are very refractory, though an exception should be made with regard to the orbital mucosa, which is generally very amenable to the action of radium."

"Speaking in general terms sarcomata if taken in their early stages, and before dissemination has occurred, do very well under radium treatment. The burying within the growth of tubes of radium salts or radium emanation should be resorted to whenever practicable, and the action of these tubes may be much helped by the external application of radium plates heavily screened."

"It is important to use a large quantity of radium, and to give a heavy dosage. Small doses should be avoided, as they exert a distinctly irritating effect and stimulate the growth of the tumor. The best results are obtained in sarcomata of the tonsil and post-nasal space, and the results in many such cases are amazing, the growths completely disappearing within six weeks of the treatment. Lymphosarcomata also give excellent results. Melanotic sarcomata are not influenced by radium, and in the few cases that have been treated no benefit has been observed."

In lymphadenoma "when the disease is localized and confined to one or more small superficial areas the disappearance of the enlarged glands is frequently brought about by the use of radium, and the progress of the disease is thus arrested."

"When, however, the condition is generalized, the employment of numerous large and powerful applicators becomes necessary, and this heavy dosage is almost always followed by severe systemic disturbance, with high temperature and general malaise. After the reaction has subsided considerable improvement is often apparent, but this is only temporary in character, and the condition sooner or later returns with increased severity."

"In almost every instance of mediastinal tumors that have come under observation the rate of growth has been very markedly checked by the use of radium, and in one or two cases a definite decrease in the size of the tumor, as seen by X-ray screening, has undoubtedly occurred."

"If the condition be accompanied by an accumulation of fluid in the pleura and paracentesis be performed, radium appears to exert a very remarkable action in lessening the tendency of the production of further effusion."

"In these cases the use of a very large quantity of radium (400 to 500 mgm.) is indicated. The applicators should be screened with 2 mm. of lead, and disposed in such fasion over the chest wall as to procure the maximum 'cross fire' irradiation."

"Treatment must be very persistent, a total exposure of not less than thirty hours should be given, and the series repeated at the end of four weeks. This heavy dosage is almost invariably followed in two or three days by a feeling of great fatigue and exhaustion, but this condition passes off completely in about a week's time."

"In fibroid diseases of the uterus radium exerts a most beneficial action upon the distressing symptoms, menorrhagia and metrorrhagia, which are the almost invariable concomitants of this condition, though it seldom produces any very great diminution in the size of the uterus. As the cervical canal is rarely sufficiently patulous to admit a screened radium tube without previous dilatation, and patients are often averse from this, the treatment may be carried out by the introduction of a tube containing 100 mgm. of radium, screened with 2 mm. of lead, into the posterior fornix, and applying a plate of from 80 to 100 mgm. similarly screened over the fundus uteri."

"The total exposure should be between thirty and sixty hours, spread over from five to ten days, and the series should be repeated after six or eight weeks. The first effect noted is the checking of the metrorrhagia, and this followed by a progressive decrease of the menorrhagia until the flow becomes normal, or sometimes ceases altogether."

"Leucoplakia patches on the tongue, cheek, or vulva, are speedily removed by radium, but they tend to recur sooner or later. Half-strength plates screened with 0.1 mm. of lead should be used, and exposures varying from one to three hours duration, according to the thickness of the lesion should be given. A slight superficial reaction takes place and the patches disappear."

"Before expressing an opinion as to the possibility of radium treatment effecting an improvement in any particular instance of flat superficial naevi, capillary naevi 'port wine stains', etc., it is advisable to subject the lesion to diascopy. If blanching is readily effected by gentle pressure, the result of the treatment will probably be satisfactory; but if it be found impossible to produce blanching except by great pressure, it is unlikely that radium can do much for the condition."

"Infinite patience is necessary in the treatment of superficial

naevi, and the utmost caution must be observed. It is best to use quarter or half strength applicators screened with 0.01 mm. of aluminum and to start with short exposures of from fifteen to twenty minutes' duration, gradually increasing the length of the same until a satisfactory reaction has been obtained. So soon as the lesion has assumed a salmon-pink color, the screening should be altered to 0.1 or 0.2 mm. of lead, and the length of exposure increased to one, one and a half, or two hours."

"Cavernous naevi do excellently under radium, especially when of such shape that 'cross fire' radiation is possible. Half strength applicators screened with 0.1 mm. of lead should be employed, and the exposure should be from one to three hour's duration, spread over three successive days. Little or no surface reaction is produced by this method of treatment, and the naevus shrinks gradually and steadily. If, on palpation, the presence of a pulsating vessel is appreciable, the case is not likely to prove completely successful unless the vessels be first ligated."

"Warts and Papilomata yield readily to short exposures of from twenty minutes to one hour's duration with half strength apparatus unscreened. The reaction is but slight and the resultant scar scarcely noticeable."

"Tuberculosis of Glands.—In cases in which surgical measures have been declined for cosmetic reasons, radium often proves of considerable value, either when used alone or as an adjunct to vaccine treatment. Heavily screened exposures of thirty or more hours' duration should be resorted to and an effort made to secure 'cross fire' irradiation where practicable. If the glands be caseating, radium treatment is of very little use."

"Lupus Vulgaris.—As a routine treatment for this disease *Finsen* light is greatly to be preferred to radium, but where it fails to affect a cure or improvement radium sometimes proves of great use. Unscreened exposures of one or two hours' duration must be given and a destructive reaction produced, the resultant scar is usually firm, smooth, supple, and inconspicuous."

"In spring catarrh the employment of radium is strongly to be advocated, as it will often cure the most intractable cases. Personal idiosyncrasy is, however, a very important consideration, and it is essential to proceed with great caution, giving short unscreened exposures at intervals of a fortnight, and carefully noting the reaction. If the dosage can be accurately adjusted, the granulations on the orbital conjunctiva gradually disappear, there is no marked inflammation, and no resultant scarring of the mucous membrane. A special form of applicator should be used which can readily be introduced into the conjunctival fornices. It should be of full strength, and the first exposure should not exceed fifteen minutes' duration. No screening is employed. If the effect be not satisfactory the length of the exposure may be increased to twenty, twenty-five or thirty minutes until the desired result is obtained."

"Keloids give most excellent results when treated with radium, and a general improvement if not complete cure, can be safely predicted. In tender and painful keloids the anaesthetic

effect of radium is generally very marked, and appears very early in the treatment."

"Screening with 1 mm. of silver is almost always employed, and an exposure of from eighteen to thirty hours spread over from three to five days, according to the size and thickness of the lesion, is given. This brings about a gradual absorption of the keloidal tissue unaccompanied by any surface irritation."

"Lupus Erythematosus.—This very intractable and puzzling disease often responds favorably to radium, even after all routine methods have failed. Short exposures with half or quarter strength apparatus slightly screened and repeated at intervals of four weeks give the best results."

"Psoriasis and Chronic Eczema.—Both of these conditions generally yield readily to short unscreened exposures of from two to five minutes' duration, given on three successive days, the series of exposures being repeated at intervals of a fortnight. The patches quickly disappear after a slight superficial reaction, and in eczematous cases there is but little tendency to recurrence. With psoriasis, however, the disease almost invariably reappears after a time, though with some patients the interval that elapses may be of many months' duration."

"Lichenification of the skin, with its attendant intolerable itching, is quickly relieved and often completely cured by one exposure of ten or fifteen minutes' duration to a half strength applicator screened with 0.01 mm. of aluminum. Some very obstinate cases which have hitherto defied all the usual methods of treatment have responded most favorably to this procedure, the lesions have disappeared and have not recurred."

"Pruritus.—The analgesic effect of radium is often of the greatest use in this disease, and short unscreened exposures frequently produce a degree of relief which is unattainable by any other measures. This is especially noticeable if the pruritus occur in association with a definite lesion such as leucoplakia or hyperkeratosis. If the dosage be carefully considered and the treatment repeated at fortnightly intervals until the skin is restored to its normal condition, complete and permanent cure may result. If, however, the condition be a neurosis, the prognosis is not so hopeful, and the benefit derived, if any, is not likely to be of very long duration."

"Few patients suffering from exophthalmic goitre have as yet been treated at the institute, but the results obtained are sufficient to justify a trial of radium when other treatments have failed to produce any result. Prolonged exposures of thirty or more hours' duration in all should be given, with heavily screened apparatus containing 200 or 300 mgm. of radium, the apparatus being so disposed as to cover as much as possible of the gland surface."

"Three or four weeks usually elapse before any effect is appreciable, but from that time on a gradual diminution in the size of the gland, with slowing of the heart's action, lessening of tremor and of the degree of proptosis, may be looked for. The series of exposure should be repeated at intervals of three or four months."

"Arthritis Deformans.—The daily administration of 250 c.c. of radium emanation solution of a strength of not less than 1 millicurie per liter to patients suffering from this obstinate and painful and crippling disease is sometimes attended by very remarkable results. It is difficult to predict with certainty the degree of improvement likely to occur in any particular instance, but the cases which appear to derive most benefit are those in which the disease is of relatively short duration, and the changes are periarticular in type and multiarticular in distribution. The age of the patient also exerts some influence, those under 40 responding more quickly to the action of the emanation. Cases with a definite gouty history sometimes experience an acute exacerbation of all their symptoms within the first week or ten days of their treatment, but this disturbance is quite transient, and is usually followed by a distinct change for the better."

"Little or no improvement can be looked for in instances where cartilaginous or osseous changes are predominant, and the radium emanation solution is powerless to bring about the absorption of osteophytic growths or the loosening of fibrous or bony ankylosis."

When limitation of movement is due to periarticular fibrous thickening considerable increase of mobility often follows on the taking of the radium water and enables patients to perform actions, such as feeding themselves, brushing their hair, shaving, etc., which they may have been powerless to do for some months or even years."

"Other favorable effects of the treatment are the lessening or disappearance of the muscular and articular pains, the grating of the joints on movement is not so marked, the muscles regain much of their lost tone, and the patient's general health is much improved. This is especially noticeable when the patients are suffering from anaemia, the haemoglobin index being rapidly increased."

"Much research work has yet to be undertaken to enable an accurate opinion to be formed of the manner in which radium emanation solution produces these results, as its action appears to be a multiple and highly complex one, but the reinforcing of the body ferments, the increase of tissue oxidation, and the dissolving uric acid are undoubtedly factors which contribute to its success."

NEW BOOKS.

Radium and Radiotherapy. Radium, Thorium, and other Radio-active Elements in Medicine and Surgery. By William S. *Newcomet,* M. D. vii and 315 pages, with 71 engravings. Lea and Febiger. Philadelphia and New York, 1914. From the preface we learn that *"the creation of this work has been prompted by the many solicitations of the author's friends and the inquiries*

of many others as to where it might be possible to obtain authoritative information upon the subject of radium and its scientific and medicinal properties. The reason for these queries is that if the medical literature of the day is carefully examined, it will be found that articles upon radio-activity in the English language are exceptional. This is in marked contrast with the literature of other languages, particularly German and French, in which the most active interest prevails. While this contrast is very apparent it is not altogether without foundation, for in this country it has been difficult to procure the radio-active materials."

*"Another fact that has to some extent discouraged American investigation is that most of the radium brought to this country has been in the hands of private speculators; and in some instances which have recently been brought to the attention of the profession, an exorbitant price was paid for an extremely poor quality of radium. The purchaser, laboring under the delusion that he had obtained a specimen of sufficient strength to treat a certain condition, applied it and obtained an unfavorable result; then, after repeating the operation several times, only to meet with defeat and final discouragement, deserted the whole field, believing it worthless. Therefore, it is necessary to warn those who enter upon this study either to familiarize themselves to some extent with the physics involved, or have some physicist of standard reputation assist them in their work. * * * *"*

*"Considerable space has been devoted to the chemistry and physics of these radio-active elements, in the belief that some conception of their properties will aid materially in the interpretation of their therapeutic action, * * * *. The details and mathematical calculations have been largely omitted; for this information the reader is referred to books dealing along with radio-activity." * * * In short, the object of this volume is to place the subject of radio-activity before the medical public in a clear and comprehensive manner."*

Considering that there is great need for an English text that will place the subject of radioactivity before the medical public in a clear and comprehensive manner, the reviewer was sorely disappointed to find Doctor *Newcomet's* book so unsatisfactory. Well known facts of chemical and physical history are sadly distorted in the first chapter, which deals with the history of the development of radioactivity. After telling of *Mendeleeff's* discovery of the periodic law, a century and a half ago, and the subsequent adoption of the atomic theory of matter (!) the author passes to a discussion of the studies which led to the discovery of the cathode rays and the X-rays. *Becquerel's* wonderful discovery of the property of radioactivity is mentioned and then the author says: *"Many physicists and chemists were at this time giving this problem their greatest attention, and four years after the discovery by Becquerel, in 1900, M. Schmidt, with Professor and Madame Curie, working independently of each other, were able to isolate radium, which has revolutionized the whole scientfic world, and added thirty or more new elements to those already known, and*

has created an entirely new field for active study—radio-activity." It was in 1898, as a matter of fact that Madame *Curie* and *Schmidt* independently discovered that the element thorium possessed the property of radioactivity, and in the same year the *Curies and Bemont,* all working together, discovered radium. Three names were misspelled on the first two pages, and many more errors of the same sort occur later. (Mendelieyeff for Mendeleeff, p. 17; Farraday for Faraday, Wiedermann for Wiedemann, p. 18; Ramsey for Ramsay, p. 28, 166; Sadot for Sidot, p. 50, 64; Keinboch for Kienbock, p. 74; Degras for Degrais, p. 175, 180; Hagel for Hugel, p. 194; Wameknos for Warnekros, p. 196, etc.).

The introductory chapter is followed by seven chapters which are devoted to the chemistry and physics of the radio-elements. The garbled statements and questionable arrangement of the material would no doubt leave a reader who was more or less uninformed in regard to radioactivity with some rather remarkable and vague ideas. Certainly the reader's perspective of the subject would be quite abnormal. It is not the reviewer's intention to point out all of the errors which were observed in this part of the book. It is unfortunate, however, that the author did not follow the advice he gives in the preface and *"have some physicist of standard reputation assist"* him in his work. Some of the statements are so misleading that a word of comment seems called for. Thus on page 28 we see that *"radium emanation (Sir William Ramsey proposed the name Nitron) is a gas; its parent is radium. It belongs to that class of inert gases which do not seem to enter into chemical combinations with other elements, and therefore is like nitrogen, but still more inert, being an analogue of xenon. The atomic weight is* 222.5; *density* 111.25; *and is so heavy that some elements, such as mercury or lead, would float upon it."* The name suggested by *Ramsay* was "niton" meaning "the glowing one," and not "nitron" as we find it printed on page 28, and also in the index. While nitrogen is a comparatively inert element we take exception to comparing a gas like radium emanation to it, for certainly nitrogen is a constituent of numerous organic and inorganic compounds, whereas radium emanation forms no compounds, using the word in its ordinarily accepted meaning. The vapor density of the emanation has caused someone to use a bit of imagination, for it certainly requires the exercise of that faculty to have radium emanation gas buoying up lead or mercury.

After stating that *"heat is liberated spontaneously and at the rate of one small calorie, melting the amount of ice equal to its own weight every hour,"* we are told that *"to show the enormous amount of energy stored in radium, it has been calculated if the energy could be employed in the same manner as coal, a quantity the size of a pin head would be sufficient to light London for one year."* The author does not make it clear to the reader that the greater part of the energy stored in the radium is not available, and as to the magnitude of this energy we can only make guesses; whereas, the amount of energy that a gram of radium does give off in the course of its disintegration to lead (?) has been quite

accurately determined and amounts to about the energy furnished by the burning of a half ton of coal. A large amount of energy from so small amount of matter, but not much when it comes to lighting London. Similarly, on page 49, referring to the disintegration of uranium we learn that *"if the energy given off in this change that is constantly occurring in uranium, could be burnt as coal, the heat supplied by one gram, or fifteen grains, would be sufficient to produce enough steam for a locomotive to pull a train of cars to Mars and back again."* This statement is quite incorrect and a rather natural consequence of confusing internal atomic energy, which is of unknown magnitude, with the energy liberated by the radio-elements in the course of their transmutation. Again, on page 71, where the matter of standards is being discussed, the statement is made that *"one curie is is that quantity of radium emanation derived from* 1 *gram of radium element in equilibrium: equal to 0.6 c.mm. at a temperature of 0°C., and a barometric pressure of* 760 *mm., correction for vapor densities, etc. This standard is maintained at Paris; the original being maintained alone, away from all influences that in any way could affect its equilibrium. From this one secondary standards are made and sent out to different centres such as Vienna, London, etc., and from these again others are made for measurements and for comparisons in ordinary laboratory work."* The author has confused radium and emanation standards until it is difficult to make out whether the international standard is a curie of emanation or the specimen of pure radium chloride prepared by Mme. *Curie* for that purpose. On pages 72 and 73 the data for converting the various units, which have been used to measure concentrations of emanation, is misleading because of errors. The first sentence on page 72, which reads: *"the mache unit expresses the saturation of the emanation of radium, free from products of decay, from one liter of solution or gas" is* meaningless because the words "ionization current" are omitted after the word "saturation."

The part on pages 38 to 45, dealing with the thorium group of radio-elements, is misleading because the author does not distinguish clearly between the faintly radioactive thorium and the rapidly distintegrating mesothorium I.

Half period of decay of the radio-elements and the average life of the radio-elements are badly tangled, and used as though they were the same. Tables are quoted, without giving references, and insufficient information is given as to what the tabulated data means. (Cf. page 26, where the unit of current of the ionization currents due to different radioactive ores should be stated to be the ampere, and page 58 where the thickness of the aluminum is given in millimeters). Obsolete applicators (rubber or horn capsules with a mica window), which are rapidly passing out of use because of the insufficient protection that they give to radium, etc., are described in detail, as are qualitative methods for testing radioactivity, (phosphorescence and the effects on photographic plates) methods which are of little scientific value for radiumtherapy. It

is necessary to know the amount of radium in a preparation if data obtained by the use of the radium is to be of scientific value. Too much of the work of a number of the pioneers in radium therapy is of little value because of the lack of such accurate data.

The remaining chapters treat of the physiological and therapeutic applications of the radio-elements. Considering the great amount of data which has piled up in the literature, these chapters offer a very superficial treatment of the subject. The desire to have a variety of applications rather than a carefully discriminating treatment of the better developed applications, seems to have guided the author in the choice of material. For example, *Hugel's* results (page 194) are given without comment, although abroad they are regarded as doubtful. The report of A. E. H. *Pinch,* Director of the London Radium Institute, which appeared in the British Medical Journal for January 25, 1913, has been freely quoted. To the reviewer this report has always seemed to be the best published article on radiumtherapy available in English. The results of *Wickham* and *Degrais,* as embodied in their book on Radiumtherapy, also furnish a great deal of good material which the author cites.

Faulty spelling, poor English, glaring misstatements, garbled facts, poor order of presentation and a general air of superficiality and hasty throwing together mark this book. While it does contain much that is correct and of value, this loses its value, certainly, for the purpose for which it was intended, because of the above mentioned faults. It is the reviewer's opinion that this book would not be a good one for a physician to study if he desired to obtain a clear and comprehensive knowledge of the subject of radioactivity. C. H. V.

NOTES AND COMMENTS.

Great interest is being shown in England in the use of radium for the treatment of malignant growths. The following, quoted from the London Daily Chronicle, March 30th, 1914, shows that many of the large cities are raising funds for the acquisition of radium to be used in their hospitals:

"In Manchester, where the seven principal hospitals are co-operating, nearly 5,000 pounds ($25,000) have been subscribed. There will be a central department in charge of an expert in connection with the Royal Infirmary. In Glasgow several thousand pounds have been raised and the University has placed a room at the disposal of the committee under the supervision of Prof. *Soddy,* one of the greatest authorities on the subject."

"In Sheffield the fund now stands at over 5,000 pounds and the members of the medical profession there are taking the keenest interest in the movement. In Dublin it has been decided to keep the radium in the laboratory of the Royal Dublin Society, under the care of Prof. *Joly,* of Dublin University, the emanation being used for distribution to the hospitals when required.

"The question of securing radium for the Poor-law infirmaries is also being considered. It has been suggested that in London a central supply should be secured and placed in charge of an expert, perhaps under the Metropolitan Asylums Board."

"In Manchester the Board of Guardians have applied to the Local Government Board for authority to expend 2,500 pounds in the purchase of radium. In Portsmouth, where efforts are being made to collect 2,000 pounds, the guardians propose to contribute 100 pounds to the fund, on condition that the radium apparatus is made available for use in their institutions for an amount of time proportional to their contribution; that is, one day in 20."

* * * * *

The Annual Meeting of the German Society of Surgeons was held in April at Charlottenburg near Berlin. One day of the meeting was devoted entirely to papers and discussions on the use of radioactive substances in therapy. Professor *Habs* (Madgeburg) gave a very detailed paper on the technique of the application of radium. He prefers to divide the quantity of radium at disposal into many tubes and suggests long duration of the application. He described excellent results obtained in the treatment of skin carcinoma and carcinoma of the breast and declared that complete success could be secured only in cases where it is possible to apply the radium to all spots where carcinomatous cells occur. Professor *von Eiselberg* (Vienna) recorded a few cases of malig nant growths, where treatment with radium was followed by the complete disappearance of the growth. In one or two of these cases, however, recurrences were observed. He insists that only tumors which cannot be operated upon should be treated with radium, except in cases of superficial skin cancer, where radium treatment might be tried before operation. He specially recommends that every cancer case, after operation, should be treated with radium rays in order to destroy and cancerous tissues left after the operation. This lecture from the director of the Vienna Clinics of Surgery, who, as is well known, was formerly very sceptical regarding radium application, created quite a sensation at the meeting. Professor *Wendel* (Madgeburg) reported the result of a great number of cases treated with radium and mesothorium. He declared that there could be no doubt that the radioactive substances destroy cancer even where the X-ray treatment failed completely. The other speakers in the discussion, *Tilmann* (Cologne), *Werner* (Heidelberg), *Heimann* (Gynecological Clinic, University of Breslau), *Gunkel* (Fulda), *Rosenstein* (Berlin), and others, were all unanimous regarding the excellent results obtained in treatment of cancer with radium, and they all agreed that aside from the knife of the surgeon, radium rays are the only other active agents to combat cancer. Difference of opinion was expressed as to whether in those cases of cancer where operation is possible, radium treatment should be tried before operating (this is the standpoint of Prof. *Kroenig,* (Freiburg), who spoke strongly in favor of it) or whether only such cases as cannot be operated upon should be treated with radium (as Prof. *Tilmann* and others insist).

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